

Docking Fixture and Mechanism for a Protective Suit

One can transfer safely and quickly between the suit and a sealed vehicle.

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A suitlock assembly that comprises a docking fixture and mechanism has been invented to facilitate and accelerate donning and doffing of a sealed protective suit and/or to enable ingress and egress between the protective suit and a sealed vessel. The sealed protective suit could be a space suit, in which case the sealed vessel could be a spacecraft. Alternatively, the sealed suit could be an environmental protective suit of a type worn on Earth during cleanup of a hazardous-material site, in which case the sealed vessel could be a vehicle equipped to maintain a safe interior environment for workers in transit to and from the site. Figure 1 depicts a typical situation in which several crewmembers are working inside such a vehicle, one is working outside in a protective suit, and one is donning or doffing a protective suit while holding onto an overhead bar for support.

The suitlock assembly surrounds a large opening in the back of the suit and can be attached to or detached from a containment assembly or hatch on the vehicle. A person enters or leaves the suit through the opening surrounded by the suitlock assembly. Once the person is inside the suit, the

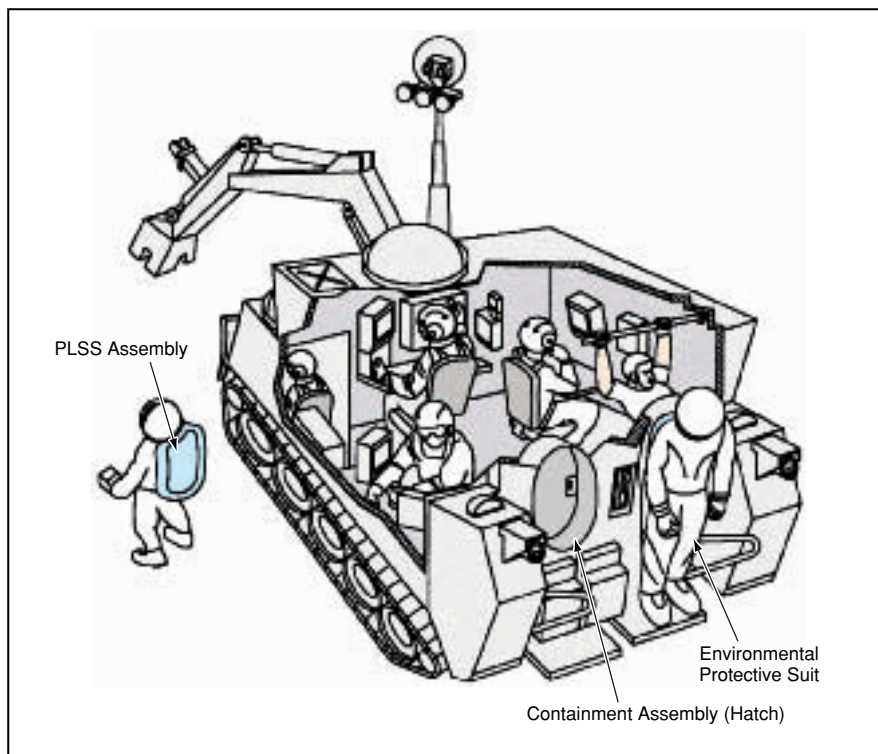


Figure 1. A Sealed Vehicle Includes Hatches that enable workers to transfer between the interior of the vehicle and the interiors of protective suits that must be worn outside the vehicle.

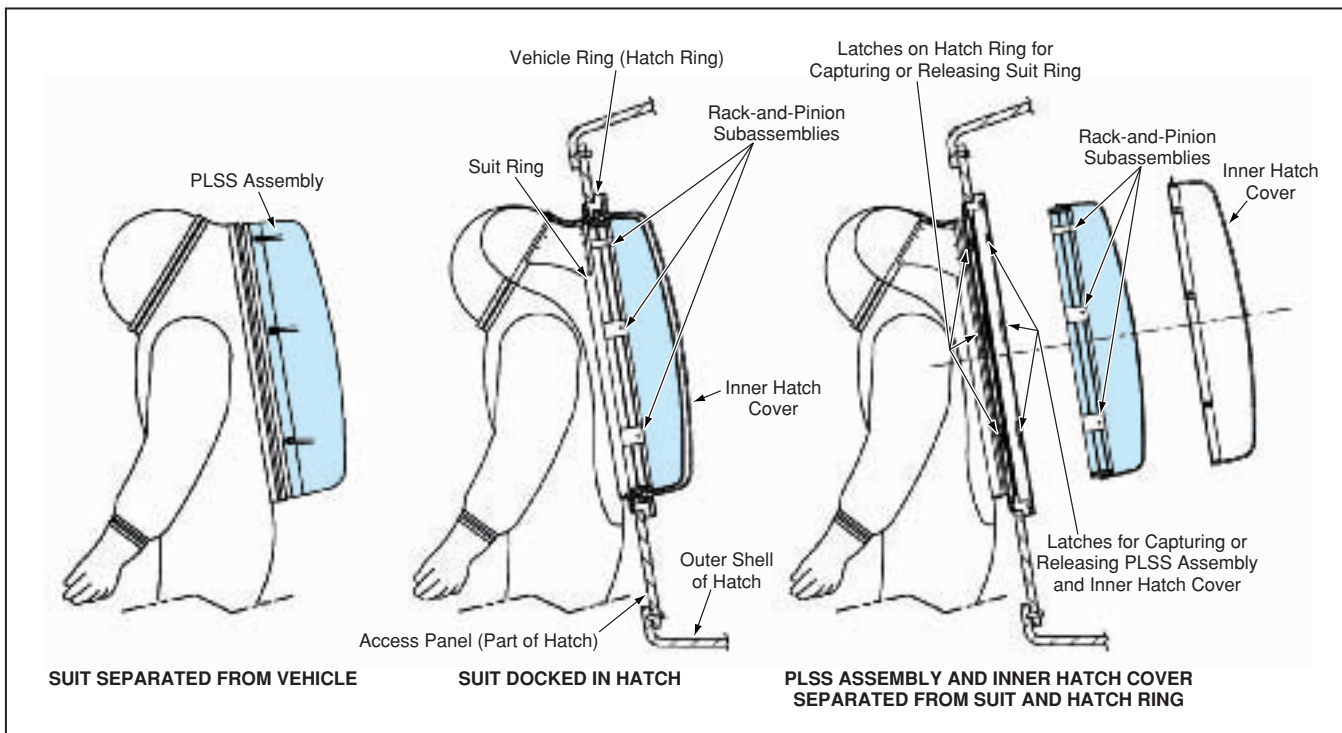


Figure 2. The **Suitlock Assembly**, **PLSS Assembly**, and **Hatch** are all designed to function cooperatively for relatively rapid coupling and uncoupling of the sealed suit and the sealed vehicle, coupling and uncoupling of the PLSS assembly and the suit, and transfer of the PLSS assembly and the wearer through the hatch at the appropriate phases of operation.

suitlock assembly serves as a means for attaching or detaching a portable life-support system (PLSS) assembly, which is sealed to the suitlock assembly and provides breathing air and cooling when the wearer is sealed in the suit.

In preparation for leaving the suit and entering the vehicle, the wearer maneuvers backward, inserting the PLSS assembly into a recess in the hatch. The wearer then pushes backward until a suit ring and elastomeric seals on the suitlock assembly mate with sealing surfaces on a vehicle ring on the hatch and spring-loaded latches capture the suitlock assembly in the hatch. The seals protect the interiors of both the suit and the hatch against the external envi-

ronment. The interior of the hatch can then be purged to remove any contamination brought in from the outside. Once the purge is complete, it is safe to open the hatch to the interior of the vehicle.

The wearer turns a handle (not shown in the figures) at the lower right corner of the suitlock assembly to actuate a cable linkage that, in turn, actuates latches and rack-and-pinion subassemblies at several positions around the periphery of the opening. The overall effect of this action is to detach the PLSS assembly from the suit and the inner hatch cover from the hatch ring and to transfer the PLSS assembly into the hatch. The inner hatch cover and the PLSS assembly can then be taken into

the interior of the vehicle to make room for the wearer to leave the suit and enter the vehicle. The foregoing sequence of operations is reversed for a wearer donning the suit and leaving the vehicle.

*This work was done by Philip Culbertson, Jr., of **Ames Research Center**. Further information is contained in a TSP [see page 1].*

This invention has been patented by NASA (U.S. Patent No. 5,697,108). Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to the Patent Counsel, Ames Research Center, (650) 604-5104. Refer to ARC-14102.